

transit the Carquinez Strait each year (Caltrans, 1997).

Because of the large numbers of vessels operating in these restricted waters, a comprehensive vessel traffic system has been established to provide for safe vessel movements. This system begins over 10 miles outside of the Golden Gate where a Traffic Separation Scheme (TSS) has been established. It is composed of: 1) three directed traffic areas, each with one-way inbound and outbound traffic lanes separated by defined separation zones, 2) a precautionary area and 3) a pilot boat cruising area (see Figure 5). The TSS is recommended for use by vessels approaching or departing the Bay, but is not necessarily intended for tugs, tows or other small vessels that traditionally operate close inshore or outside of the usual steamer lanes. This TSS has been adopted by the International Maritime Organization (IMO). Another TSS, not yet adopted by the IMO, has been established through the main ship channel and Golden Gate into San Francisco Bay.

In addition to these entrance schemes, the United States Coast Guard (USCG) has established a Vessel Traffic System (VTS) for the San Francisco Bay and approaches. The VTS also has three main components: 1) a position reporting system, 2) traffic routing and anchorage monitoring and 3) a communication and surveillance system. Participation in the VTS is currently voluntary.

Three different position reporting requirements exist for vessels operating within the VTS service area: 1) those operating offshore, 2) those operating within the radar surveillance areas of the Bay, and 3) those operating beyond radar range. In all three areas, vessels are requested to report to the VTS at certain locations, and when certain actions occur, such as getting underway, or encountering potentially hazardous situations.

2. Potential Hazards to Navigation

Hazards to navigation in the Bay Region can be divided into five categories: 1) shoals and islands, 2) bridges, 3) fog and inclement weather, 4) vessel traffic and 5) tides and currents. A shoal area exists just west of the Golden Gate Bridge and north of the main entry channel to the Bay. This area, known as Four-Fathom Bank or Potato Patch Shoals, is a potential hazard for any vessel with a draft of over 24 feet, and for smaller vessels in stormy conditions. Once inside the Golden Gate, islands and shallow areas around islands including Alcatraz, Angel Island, Treasure Island and Yerba Buena Island are hazards to navigation, and when combined with elements such as fog, traffic or malfunctioning radar equipment can be extremely dangerous. The traffic lanes themselves are free of obstructions, with the exception of Alcatraz Island and the Alcatraz Shoals just west of the Island.